

CLAIMS

What is claimed is:

1 1. A method for determining a type of disc in an optical disc
2 recording/reproducing device comprising a photodetector divided into at least two light
3 receiving sections in a radial direction, comprising:
4 generating a radial push-pull signal from a difference between light receiving signals
5 from a disk and received by the at least two light receiving sections, wherein the disk
6 comprises one of a first disk and a second disk;
7 detecting an upper envelope signal and a lower envelope signal from the radial push-
8 pull signal;
9 detecting a phase difference between the upper envelope signal and the lower
10 envelope signal; and
11 distinguishing the first disk from the second disk according to a magnitude of the
12 phase difference, wherein the second disk comprises a density higher than the first disk.

1 2. The method as recited in claim 1, wherein the distinguishing determines the first
2 disk if the phase difference is greater than or equal to a reference phase difference.

1 3. The method as recited in claim 1, wherein the distinguishing determines the
2 second disk if the phase difference is less than a reference phase difference.

1 4. The method as recited in claim 1, further comprising
2 receiving the magnitude of the phase difference and the light receiving signals and
3 outputting servo error signals;
4 using the servo error signals to output a voltage to drive a spindle motor of the disk.

1 5. The method as recited in claim 1, further comprising
2 generating a first track cross signal from an envelope of an RF SUM signal, wherein
3 the RF SUM signal is obtained by adding the light receiving signals;
4 generating a second track cross signal from an envelope of the radial push-pull
5 signal; and
6 selectively outputting one of the first track cross signal and the second track cross
7 signal according to the distinguishing of the first disk from the second disk.

1 6. The method as recited in claim 1, further comprising
2 comparing the upper envelope signal with a predetermined threshold prior to
3 detecting the phase difference; and
4 binarizing the upper envelope signal prior to detecting the phase difference.

1 7. The method as recited in claim 1, further comprising
2 comparing the lower envelope signal with a predetermined threshold prior to
3 detecting the phase difference; and
4 binarizing the lower envelope signal prior to detecting the phase difference.

1 8. A method, comprising:
2 detecting a phase difference between an upper envelope signal and a lower envelope
3 signal from a radial push-pull signal, wherein the radial push-pull signal is a difference
4 between at least two light receiving signals from a disk and received by at least two light
5 receiving sections in a photodetector, wherein the disk comprises one of a first disk and a
6 second disk; and
7 distinguishing the first disk from the second disk according to a magnitude of the
8 phase difference, wherein the second disk comprises a density higher than the first disk.

1 9. The method as recited in claim 8, wherein the distinguishing determines the first
2 disk if the phase difference is greater than or equal to a reference phase difference.
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4 10. The method as recited in claim 8, wherein the distinguishing determines the
5 second disk if the phase difference is less than a reference phase difference.

1 11. The method as recited in claim 8, further comprising
2 generating a first track cross signal from an envelope of an RF SUM signal, wherein
3 the RF SUM signal is obtained by adding the light receiving signals;
4 generating a second track cross signal from an envelope of the radial push-pull
5 signal; and
6 selectively outputting one of the first track cross signal and the second track cross
7 signal according to the distinguishing of the first disk from the second disk.

1 12. A method, comprising:
2 obtaining a magnitude of a phase difference between an upper envelope signal of a
3 radial push-pull signal and a lower envelope signal of the radial push-pull signal and
4 determining a type of disk therefrom.

1 13. The method as recited in claim 12, further comprising
2 dividing a photodetector into at least two light receiving sections in a radial
3 direction; and
4 generating the radial push-pull signal from a difference between light receiving
5 signals from a disk and received by the at least two light receiving sections, wherein the
6 disk comprises one of a first disk and a second disk.

1 14. The method as recited in claim 13, further comprising
2 receiving the magnitude of the phase difference and the light receiving signals and
3 outputting servo error signals;
4 using the servo error signals to output a voltage to drive a spindle motor of the disk.

1 15. The method as recited in claim 14, further comprising
2 generating a first track cross signal from an envelope of an RF SUM signal, wherein
3 the RF SUM signal is obtained by adding the light receiving signals;
4 generating a second track cross signal from an envelope of the radial push-pull
5 signal; and
6 selectively outputting one of the first track cross signal and the second track cross
7 signal according to the distinguishing of the first disk from the second disk.

1 16. A method generating a track cross signal in an optical disk
2 recording/reproducing device comprising a photodetector divided into at least two light
3 receiving sections in a radial direction, comprising:
4 generating a first track cross signal from an envelope of an RF SUM signal, wherein
5 the RF SUM signal is obtained by adding light receiving signals from the at least two light
6 receiving sections;
7 generating a second track cross signal from an envelope of a radial push-pull signal,
8 wherein the radial push-pull signal is obtained from a difference between the light receiving

9 signals from a disk and received by the at least two light receiving sections and wherein the
10 disk comprises a first disk and a second disk;

11 distinguishing the first disk from the second disk and outputting a signal indicative
12 thereof, wherein the second disk comprises a density higher than the first disk; and

13 selectively outputting one of the first track cross signal and the second track cross
14 signal according to the output signal from the distinguishing.

1 17. The method as recited in claim 16, wherein the distinguishing determines the
2 first disk if the phase difference is greater than or equal to a reference phase difference.

1 18. The method as recited in claim 16, wherein the distinguishing determines the
2 second disk if the phase difference is less than a reference phase difference.

1 19. The method of claim 16, wherein the distinguishing:
2 detecting an upper envelope signal from the radial push-pull signal;
3 detecting a lower envelope signal from the radial push-pull signal; and
4 detecting a phase difference between the upper envelope signal and the lower
5 envelope signal,
6 wherein the distinguishing determines the first disk from the second disk according
7 to a magnitude of the phase difference.

1 20. An apparatus determining a type of disc in an optical disc recording/reproducing
2 device comprising a photodetector divided into at least two light receiving sections in a
3 radial direction, comprising:

4 a radial subtractor generating a radial push-pull signal from a difference between
5 light receiving signals from a disk and received by the at least two light receiving sections,
6 wherein the disk comprises one of a first disk and a second disk;

7 an upper envelope detector detecting an upper envelope signal from the radial push-
8 pull signal;

9 a lower envelope detector detecting a lower envelope signal from the radial push-
10 pull signal;

11 a phase comparator detecting a phase difference between the upper envelope signal
12 and the lower envelope signal; and

13 a type of disk determiner the first disk from the second disk according to a
14 magnitude of the phase difference and outputting a signal indicative thereof, wherein the
15 second disk comprises a density higher than the first disk.

1 21. The apparatus as recited in claim 20, wherein the radial push-pull signal is an
2 RF signal.

1 22. The apparatus as recited in claim 20, wherein the type of disk determiner
2 determines the first disk if the phase difference is greater than or equal to a reference phase
3 difference.

1 23. The apparatus as recited in claim 20, wherein the type of disk determiner
2 determines the second disk if the phase difference is less than a reference phase difference.

1 24. The apparatus as recited in claim 20, further comprising
2 a servo error generator and servo controller receiving the magnitude of the phase
3 difference and the light receiving signals and outputting servo error signals;
4 a servo driver amplifier receiving the servo error signals to output a voltage to drive
5 a spindle motor of the disk.

1 25. The apparatus as recited in claim 20, further comprising a first comparator
2 comparing the upper envelope signal with a predetermined threshold and binarizing the
3 upper envelope signal prior to detecting the phase difference.

1 26. The apparatus as recited in claim 20, further comprising a second comparator
2 comparing the lower envelope signal with a predetermined threshold and binarizing the
3 lower envelope signal prior to detecting the phase difference.

1 27. The apparatus as recited in claim 20, further comprising
2 a first track cross signal generator generating a first track cross signal from an
3 envelope of an RF SUM signal, wherein the RF SUM signal is obtained by adding the light
4 receiving signals;
5 a second track cross signal generator generating a second track cross signal from an
6 envelope of the radial push-pull signal; and

7 a switch selectively outputting one of the first track cross signal and the second track
8 cross signal according to the output signal from the type of disk determiner.

1 28. An apparatus, comprising:

2 a phase comparator detecting a phase difference between an upper envelope signal
3 and a lower envelope signal from a radial push-pull signal, wherein the radial push-pull
4 signal is a difference between at least two light receiving signals from a disk and received
5 by at least two light receiving sections in a photodetector, wherein the disk comprises one
6 of a first disk and a second disk; and

7 a type of disk determiner distinguishing the first disk from the second disk
8 according to a magnitude of the phase difference and outputting a signal indicative thereof,
9 wherein the second disk comprises a density higher than the first disk.

1 29. The apparatus as recited in claim 28, wherein the type of disk determiner
2 determines the first disk if the phase difference is greater than or equal to a reference phase
3 difference.

1 30. The apparatus as recited in claim 28, wherein the type of disk determiner
2 determines the second disk if the phase difference is less than a reference phase difference.

1 31. The apparatus as recited in claim 28, further comprising
2 a first track cross signal generator generating a first track cross signal from an
3 envelope of an RF SUM signal, wherein the RF SUM signal is obtained by adding the light
4 receiving signals;

5 a second track cross signal generator generating a second track cross signal from an
6 envelope of the radial push-pull signal; and

7 a switch selectively outputting one of the first track cross signal and the second track
8 cross signal according to the output signal from the type of disk determiner.

1 32. An apparatus, comprising:

2 a type of disk determiner obtaining a magnitude of a phase difference between an
3 upper envelope signal of a radial push-pull signal and a lower envelope signal of the radial
4 push-pull signal and determining therefrom the type of disk and outputting a signal
5 indicative thereof.

1 33. The apparatus as recited in claim 32, further comprising
2 a photodetector divided into at least two light receiving sections in a radial direction;
3 and
4 a radial push-pull signal generator generating the radial push-pull signal from a
5 difference between light receiving signals generated by the at least two light receiving
6 sections.

1 34. The apparatus as recited in claim 33, further comprising
2 an upper envelope detector detecting the upper envelope signal from the radial push-
3 pull signal; and
4 a lower envelope detector detecting the lower envelope signal from the radial push-
5 pull signal.

1 35. The apparatus as recited in claim 34, further comprising
2 a servo error generator and servo controller receiving the magnitude of the phase
3 difference and the light receiving signals and outputting servo error signals;
4 a servo driver amplifier receiving the servo error signals to output a voltage to drive
5 a spindle motor of the disk.

1 36. The apparatus as recited in claim 35, further comprising
2 a first track cross signal generator generating a first track cross signal from an
3 envelope of an RF SUM signal, wherein the RF SUM signal is obtained by adding the light
4 receiving signals;
5 a second track cross signal generator generating a second track cross signal from an
6 envelope of the radial push-pull signal; and
7 a switch selectively outputting one of the first track cross signal and the second track
8 cross signal according to the output signal from the type of disk determiner.

1 37. The apparatus as recited in claim 32, wherein the type of disk is one of a first
2 disk and a second disk, wherein the second disk comprises a higher density than the first
3 disk.

1 38. An apparatus generating a track cross signal in an optical disk
2 recording/reproducing device and comprising a photodetector divided into at least two light
3 receiving sections in a radial direction, comprising:

4 a first track cross signal generator generating a first track cross signal from an
5 envelope of an RF SUM signal, wherein the RF SUM signal is obtained by adding light
6 receiving signals from the at least two light receiving sections;

7 a second track cross signal generator generating a second track cross signal from an
8 envelope of a radial push-pull signal, wherein the radial push-pull signal is obtained from a
9 difference between the light receiving signals from a disk and received by the at least two
10 light receiving sections and wherein the disk comprises a first disk and a second disk;

11 a type of disk determiner distinguishing the first disk from the second disk and
12 outputting a signal indicative thereof, wherein the second disk comprises a density higher
13 than the first disk; and

14 a switch selectively outputting one of the first track cross signal and the second track
15 cross signal according to the output signal from the type of disk determiner.

1 39. The apparatus of claim 38, wherein the type of disk determiner distinguishes the
2 first disk from the second disk according to a magnitude of a phase difference between an
3 upper envelope signal of the radial push-pull signal and a lower envelope signal of the
4 radial push-pull signal.

1 40. The apparatus of claim 38, wherein the type of disk determiner comprises:
2 an upper envelope detector detecting an upper envelope signal from the radial push-
3 pull signal;

4 a lower envelope detector detecting a lower envelope signal from the radial push-
5 pull signal; and

6 a phase comparator detecting a phase difference between the upper envelope signal
7 and the lower envelope signal,

8 wherein the type of disk determiner distinguishes the first disk from the second disk
9 according to a magnitude of the phase difference.